INTEGRATION PROJECT EXPERT PANEL

RISK SUBPANEL

CLOSEOUT REPORT ON SUBPANEL MEETING OF APRIL 30, 1999

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Ralph O. Patt

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Prepared under the auspices of the Groundwater/Vadose Zone Integration Project
For the U.S. Department of Energy, Richland Operations Office
Richland, Washington 99352

FOREWORD

The Integration Project Expert Panel (IPEP) was formed in 1998 under the auspices of the Groundwater/Vadose Zone Integration Project at the Hanford Site of the U.S. Department of Energy (DOE). This Project is funded by DOE Richland Operations and managed by Bechtel Hanford, Inc.

The purpose of the IPEP is to provide the Integration Project with independent advice and recommendations on key programmatic, technical, and administrative issues affecting the success of the Project.

The IPEP is composed of eight individuals, independent of DOE, having a diverse set of technical backgrounds and experience relevant to the clean up of the Hanford Site.

This document is a product of IPEP member efforts working through an officially constituted Subpanel. The views expressed in the document represent a consensus of all eight Panel members, except where specifically noted.

INTEGRATION PROJECT EXPERT PANEL
Risk Subpanel

Report on Risk Subpanel Meeting of April 30, 1999

James R. Karr and Ralph O. Patt

Risk Subpanel Membership: James R. Karr, Chair, and Ralph O. Patt

Meeting Objectives

During its February, 1999, meeting the Integration Project Expert Panel noted that the various dimensions of risk—identification, assessment, and management—are central to the Integration Project. The Panel's closeout report raised questions about the extent to which these and other dimensions of risk were being used to guide decision making within the Integration Project. The Risk Subpanel was formed to (1) explore the status of risk as a framework for decision making within the Integration Project and (2) acquaint the Panel with the dimensions of risk as articulated by stakeholders, regulators, Tribal Nations, and the Department of Energy and its contractors.

Approach

As a first step to accomplish these general goals, a one-day meeting on risk was held at Bechtel Hanford on April 30, 1999. The agenda (Appendix A) included reviews of three topics: (1) current status of activity in the Integration Project; (2) recent work by Karr and colleagues on the measurement of biological condition with an eye toward evaluation of ecological health and risk (Karr and Chu 1997, 1999); and (3) dependency webs as an approach to examining risks in the SAC. The fourth session was a roundtable discussion that focussed on five questions:

- **How is the Integration Project defining what is at risk?**
- **How is the Integration Project estimating risk for these things?**
- **What are the scientific and other foundations for development of the "at risk" list?**
- **What data or knowledge are needed to make risk assessments rigorous and comprehensive?**
- **What kinds of research and integration activities are necessary to provide required knowledge?**

Review of Day's Activities

In opening comments, Karr noted that the Expert Panel has a bias for thoughtful action in its efforts to serve many customers. Generally, the Panel will operate as a group on larger issues but will work through smaller Subpanels for specific topics. The meeting today is a first effort of one Subpanel focusing on interactions with stakeholders and Tribal Nations and with understanding risk. The Panel believes the special effort on risk is required because it would be unwise for the Panel of eight to assume that our collective conception of risk is adequate.

Historically, the concept of risk has been applied narrowly and simplistically. The effect has been to exclude substantive issues of concern to various stakeholders and Tribal Nations. The Panel believes that a broader definition is needed to ensure that tracking of appropriate endpoints is comprehensive. Thus, we are committed to discovering and incorporating all views of what is "at risk" into Panel deliberations so that we can communicate those views in our comments on the Integration Project.

Our goal, like the long-term goal of the Integration Project, is to resolve existing legacies of contamination without creating new legacies for future generations. Most important we want to avoid the legacy of a narrow or simplistic conception of risk. This means a broader approach to risk assessment and a more comprehensive definition of what is at risk. Risk within the Integration Project, for example, should be inclusive of multiple health dimensions: human, ecological, social, and economic. Our primary goals for the day are to learn what the Integration Project is doing and to gain ideas from regulators, Tribal Nations, and stakeholders on what is at risk.

A critical presentation at the meeting was by Dr. Pam Doctor (Bechtel) on dependency webs and risk. In the few months since our February meeting, it was obvious that the discussion of risk within the Integration Project, and especially within the System Assessment Capability (SAC), had substantially increased.

A framework for the risk technical elements of the Project was described. That process includes identification of metrics (the what and how to measure) that can be used to define condition and context, the evaluation of those measurements (assessments), and the more difficult task of bringing all relevant information together (risk characterization). Dependency webs are seen by Project staff as a way to manage the risk assessment process because they provide a conceptual model for assessment, a tracking tool to ensure impacts to resources are assessed, and a framework for explaining impacts and risks in a holistic or integrative way.

The Subpanel and others, including the proponents of dependency webs, recognize the need to focus on dominant issues as they frame analysis based on dependency webs. Without doubt, dependency webs provide an approach to limit the extent to which important things are left out of decision making in the cleanup of contaminated sites. A swing of the pendulum too far in the other direction, however, could result in the "paralysis-by-analysis" that may come with looking at everything. Some boundaries must be established so that web construction does not become an all-consuming activity that yields little of value to guide the project.

Another important point made in the dependency web approach is the need to focus on places or locations and the contexts in which they are embedded (ecological, social, or cultural among others).

The first level of output from the risk assessment process should be a high level complete look at resources at risk from Hanford contamination. The Project will then move on to assessment of dominance (importance) of the various components of risk, the definition of data gaps and information needs, and, eventually, the definition of priorities for future interactions of dependency web and risk analysis. One challenge to the dependency web approach is making the transition to use of comprehensive risk assessment; past uses that have been primarily limited to decision making.

After the description of recent advances in conception and use of dependency webs in the SAC, the floor was opened for discussion of the topics discussed earlier in the day or the questions originally posed to stimulate discussion during the meeting.

Many meeting participants noted the critical contribution of the Columbia River Comprehensive Impact Assessment (CRCIA 1998) to current approaches to deal with what is at risk and how some of the most severe risks can be evaluated and avoided. Oftentimes the CRCIA was defined as the "template" for conducting a comprehensive assessment. There was much praise for the individuals who produced the CRCIA report and at the same time recognition that its use as a template did not imply that it was a completed blueprint of correct actions.

Discussion for the rest of the day served as an opportunity for individuals with diverse and sometimes divergent interests to articulate their views or concerns. Rather than try to capture the subtlety of those extensive discussions, many points made in those discussions are presented here in bullet format:

- Risk discussion should not overlook the possibility that there are risks that we don't yet know about. How can we avoid being blindsided by the unknown?

- Need to get a better understanding of the role of buffers of undisturbed habitat and their influence on risks.

- Avoid tendency to discard issues that can't be quantified or that don't fit into the conventional physical-chemical modeling framework that has dominated past decision making.

- The Integration Project has made substantive strides forward in the definition of the integration goal but the execution still needs work.

- SAC, and its components such as dependency webs, are a work in progress moving toward the integration goal.

- Concern expressed that DOE at various levels has not yet embraced the Project and its revolutionary approach to an important goal.

- Need to make risk assessment rigorous and comprehensive.

- Avoid the tendency of people (scientists) scrambling to secure funding for their projects by bumping them up priority lists whether or not they are a priority integration goal. Need is for applied not basic science and challenges arise on how those decisions are made. This point is very relevant to the review process dealt with by another Subpanel.

- Questions raised about whether the Expert Panel is supposed to solicit input to guide the Integration Project or to review what the Project is doing. Others noted that the Panel needed to have good data and broad input to give good advice in either case.

- The legal drivers of the cleanup activity are of major importance to many individuals. Others urge caution in seeing regulatory and compliance issues as the defining factors.

- Concern was expressed about the huge range of possible outcomes and issues to be dealt with by dependency webs. Also noted was the importance of understanding how to decide priorities and how to define unknowns or uncertainties at several levels.

- Lack of adequate inventory of the tanks and profiles of contamination spreading from tanks, cribs, etc. hampers many dimensions of risk characterization and assessment.

- Integration Project important as a way to bring multiple players together to define issues and to work toward comprehensive tools for decision making. These are tough but critical tasks.

- Concern expressed about the energy needed from all players to move the task forward and the possibility that DOE will "deep-six the whole thing."

- Importance of openness and communication at all stages and phases in the Integration Project.

- CRCIA is different to different people, even among members of the CRCIA core group.

- Keep in mind the need to define what is not at risk as well as what is at risk.

- The Integration Project is the development of a tool, an approach that will be used in the broader social, political, and institutional process.

- Caution was urged to avoid losing the focus on the primary goal of cleanup with the discussion on understanding ecological impacts.

- Think of the evaluation of ecological impacts as the study of unintended consequences, such as the likely damage to natural resources as a result of remediation decisions.

- The dependency webs provide a framework for analysis and integration. Their success depends on individuals from diverse disciplines and from diverse knowledge and experience bases to define the appropriate measures as endpoints. A test of Integration Project success will be its ability to work with diverse groups.

- The problem of multiple dependency webs and the problems associated with integrating across those webs. In some cases, those webs may be in conflict.

- Webs like other components of the Integration Project are an evolving tool that is helping us understand some of the interconnections that have been minimized or ignored in the past.

- The dialog today was rich but I feel like I am in the movie "Groundhog Day." I have heard many of these issues before. When will we get on with it?

- Concern was expressed that the pressure to focus on risks that can be quantified should be resisted. Lack of ability to quantify risk is not a correlate of importance.

- Much is unknown and unexpected. We can never change that. Keep in mind that we must do the best we can and then live with those decisions.

- Tanks not discussed enough today. Tanks are the source. How do we manage the tanks as a source term keeping in mind that an ounce of prevention is worth a pound of cure?

- SAC is evolving rapidly and substantive progress has been made in the last few months. Risk is an important element of those advances.

- Important to keep the concepts of significant vs. insignificant in mind. Can't wait until we know everything, so must move forward doing the best we can. But it should be better than what we have done in the past. Another person notes that "just get on with it" might cause more damage unless one uses the right information.

- A critical contribution of the Integration Project is the trend toward thinking in terms of broader EIS development. It is no longer tenable to conduct EIS programs at the narrow site level. It simply hasn't work to protect the public and public funds. Sitewide EIS managed out of the Manager's Office is more appropriate.

- A wise reviewer noted that the first of the five questions posed for the day should be modified to say the following: "How are the Integration Project, the stakeholders, the regulators, and the Tribal Nation's working together to define what is at risk?"

Conclusions

Session Chair Karr then moved to close the meeting with a summary of key messages gleaned for the day. His comments represent the view of one Panel member, not of the entire Expert Panel.

1. Doing nothing involves major risks. At the other extreme, is the continuation of current programs. Both involve substantive risks and the most prudent approach is something in between those two extremes. A challenge of the Integration Project is to define that new framework.

2. The tendency to depend on models as if they provide a source of truth and objectivity can lead to bad results. Quoting from a groundwater hydrology text: "All models are wrong; but they can be useful" (Anderson and Woessner 1992).

3. A key task for the inclusion of risk in the Integration Project involves two questions: What to measure? How to decide?

4. Past analytical processes began with chemicals and made assumptions about risks, largely to human health, while assuming that the connections were simple and well known. Dependency webs, on the other hand, begin with a more diverse array of endpoints and try to understand the connection between risks to those valued endpoints. Properly instituted dependency web analysis will also examine the effects, and thus risks, of cleanup activities designed to reduce that contamination. An important task for the Integration Project is the merger of these two approaches to assessment of risk.

5. A primary measure of success of the Integration Project will certainly be how successful it can be at connecting the many detailed models that are relevant to cleanup decisions and the risks associated with taking (or not taking) those actions.

6. How will dependency webs define the dominant issues?

7. We can't wait for complete knowledge, indeed will never have complete knowledge, but at the same time it would be irresponsible to continue to ignore many dimensions of risk that have been neglected in the past.

8. Important that we go beyond the things that make sense to people as we try to anticipate the unintended consequences of actions (or inaction). Dependency webs have some complications for this reason because they are constrained by current knowledge and prejudices about what the risks are.

9. Communication is one endpoint of success. Communication among the members of the Project team is critical as is communication to other levels of the DOE hierarchy. Communication beyond the Project and Agency is equally important to engage the regulators and the Tribal Nations and other stakeholders. Unless and until all these groups are engaged, Project success will be limited.

10. By constraining the new view of integration to compliance issues and the relevant regulatory endpoints, the whole program depends on old technical conceptions or the legal drivers defined by those conceptions. In many respects, it is just those conceptions that have created today's primary challenges.

Several thoughts on the dependency web approach seem appropriate as well:

A. Be sure to extend the risk analysis to the greatest extent possible to be able to detect the unexpected.

B. Encourage SAC to continue to expand and strengthen its risk-based foundations: dependency webs and beyond.

C. Work toward the development of measures or metrics that provide interpretable signals about both system condition and risks to those systems.

D. Establish a "filter" process so that dependency webs don't become "paralysis-by-analysis." Dependency webs are a better framework for analysis but it will take major efforts to prevent ambiguity that could become like nailing Jell-O to the wall.

E. Dependency webs are a supplement to, not a replacement of, other important analysis approaches.

Recommendations

In summary, the most important outcome of the meeting was the opportunity for the diverse groups interested in risk to meet and discuss the many dimensions of their knowledge and concerns. Many expressed concern about the pace of Integration Project activity and minimal early efforts to place Project decisions in a broader risk framework. Numerous explicit recommendations are scattered throughout this report and summary of comments from participants. A few highlights among them are repeated below.

- A primary goal of Project participants should be to place Project decisions in a broad risk assessment framework

- According to several participants, the meetings provided the first opportunity for a sustained conversation about risks and how risk should be dealt with in the Integration Project.

- If the progress made in recent months is to be sustained, it is critical that the profile of "risk" be increased in SAC and the Integration Project in general.

- The first level of output from the risk assessment process should be a high level complete look at resources at risk from Hanford contamination and from the activities associated with cleanup at Hanford.

- The risk assessment process within the Integration Project should provide a conceptual model for assessment, a tracking tool to ensure impacts to resources are assessed, and a framework for explaining impacts and risks in a holistic or integrative way.

- The proponents of dependency webs need to use their approach to be comprehensive but, at the same time, to focus on dominant issues to frame analysis based on dependency webs.

- This workshop was framed by posing five questions. Our expectations were not high that we would answer those questions in a one-day meeting. And we didn't. The questions remain relevant and SAC and other Project components should keep those questions in mind as the Integration Project moves forward.

Literature Cited

Anderson, M. P. and W. W. Woessner. 1992. *Applied Groundwater Modeling: Simulation of Flow: and Advective Transport.* Academic Press, San Diego, CA.

CRCIA (Columbia River Comprehensive Impact Assessment. 1998. Screening Assessment and Requirements for a Comprehensive Assessment. Pacific Northwest National Laboratory and CRCIA Management Team. USDOE, DOE/RL-96-16 Revision 1, UC-630.

Karr, J. R. and E. W. Chu. 1997. Biological monitoring: Essential foundation for ecological risk assessment. *Human and Ecological Risk Assessment* 3: 993-1004.

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Appendix A

GROUNDWATER/VADOSE ZONE INTEGRATION PROJECT EXPERT PANEL
RISK SUBPANEL

James R. Karr, Chair
Ralph O. Patt

April 30, 1999: 9:00 a.m. to 4:00 p.m.
3350 George Washington Way, Richland, Washington
Bechtel Hanford, Inc. Assembly Room

Topic: Risk and Impact Assessment.

Purpose: Identify what is at risk, how risk will be measured and evaluated, and how to establish priorities for the risk technical element of the Integration Project.

Approach: Hear from the Integration Project Team about their logic and approach for initiating risk and impact assessment. Hold a roundtable discussion among all meeting attendees focusing on five fundamental questions related to risk and impact assessment. All attendees are encouraged to participate during the discussion period. Time is allocated at the end of the meeting for each attendee to provide a summary comment.

- AGENDA -

9:00 - 9:15	Welcome/Purpose	James R. Karr
9:15 - 10:00	Groundwater/Vadose Zone Integration Project Update • April 29 System Assessment Capability Workshop • Proposed Risk Technical Element Approach (FY99 and FY00 Deliverables and Priorities)	Michael Graham/Bob Bryce/Bob Boutin
10:00 – 10:15	Assessing Ecological Health at Hanford: Development and Application of a Multimetric Index (IBI)	James R. Karr
10:15 – 10:30	Break	
10:30 - 11:30	Dependency Webs/Big Picture Approach for Risk	Pam Doctor/Barbara Harper
11:30 - 12:30	Lunch	
12:30 - 3:00	Roundtable Discussion • How is the Integration Project defining <u>what</u> is at risk? • How is the Integration Project estimating risk for these things	All (Risk Subpanel Members/Integration Project Team/Regulators/ Tribal Nations/ Stakeholders)

	• What are the scientific and other foundations for development of the "at risk" list? • What data or knowledge are needed to make risk assessments rigorous and comprehensive? • What kinds of research and integration activities are necessary to advance knowledge required?	
3:00 - 4:00	Closing Comments	All
4:00	Adjourn	James R. Karr